```
BBBBBBBBBBBB        AAAAAAAAA        CCCCCCCCCCCC  KKK         KKK  UUU         UUU  PPPPPPPPPPPP
BBBBBBBBBBBB        AAAAAAAAA        CCCCCCCCCCCC  KKK         KKK  UUU         UUU  PPPPPPPPPPPP
BBBBBBBBBBBB        AAAAAAAAA        CCCCCCCCCCCC  KKK         KKK  UUU         UUU  PPPPPPPPPPPP
BBB         BBB  AAA         AAA  CCC              KKK         KKK  UUU         UUU  PPP         PPP
BBB         BBB  AAA         AAA  CCC              KKK         KKK  UUU         UUU  PPP         PPP
BBB         BBB  AAA         AAA  CCC              KKK         KKK  UUU         UUU  PPP         PPP
BBB         BBB  AAA         AAA  CCC              KKK      KKK     UUU         UUU  PPP         PPP
BBB         BBB  AAA         AAA  CCC              KKK      KKK     UUU         UUU  PPP         PPP
BBB         BBB  AAA         AAA  CCC              KKK      KKK     UUU         UUU  PPP         PPP
BBBBBBBBBBBB     AAA         AAA  CCC              KKKKKKKKK        UUU         UUU  PPPPPPPPPPPP
BBBBBBBBBBBB     AAA         AAA  CCC              KKKKKKKKK        UUU         UUU  PPPPPPPPPPPP
BBBBBBBBBBBB     AAA         AAA  CCC              KKKKKKKKK        UUU         UUU  PPPPPPPPPPPP
BBB         BBB  AAAAAAAAAAAAAAA  CCC              KKK      KKK     UUU         UUU  PPP
BBB         BBB  AAAAAAAAAAAAAAA  CCC              KKK      KKK     UUU         UUU  PPP
BBB         BBB  AAAAAAAAAAAAAAA  CCC              KKK      KKK     UUU         UUU  PPP
BBB         BBB  AAA         AAA  CCC              KKK         KKK  UUU         UUU  PPP
BBB         BBB  AAA         AAA  CCC              KKK         KKK  UUU         UUU  PPP
BBB         BBB  AAA         AAA  CCC              KKK         KKK  UUU         UUU  PPP
BBBBBBBBBBBB     AAA         AAA     CCCCCCCCCCCC  KKK         KKK  UUUUUUUUUUUUUUU  PPP
BBBBBBBBBBBB     AAA         AAA     CCCCCCCCCCCC  KKK         KKK  UUUUUUUUUUUUUUU  PPP
BBBBBBBBBBBB     AAA         AAA     CCCCCCCCCCCC  KKK         KKK  UUUUUUUUUUUUUUU  PPP
```

```
                                                                    I 3
**FILE**ID**RESTARTM








          RRRRRRRR    EEEEEEEEEE    SSSSSSSS  TTTTTTTTTT    AAAAAA    RRRRRRRR    TTTTTTTTTT  MM      MM
          RRRRRRRR    EEEEEEEEEE    SSSSSSSS  TTTTTTTTTT    AAAAAA    RRRRRRRR    TTTTTTTTTT  MM      MM
          RR      RR  EE          SS              TT      AA      AA  RR      RR      TT      MMMM  MMMM
          RR      RR  EE          SS              TT      AA      AA  RR      RR      TT      MMMM  MMMM
          RR      RR  EE          SS              TT      AA      AA  RR      RR      TT      MM  MM  MM
          RR      RR  EE          SS              TT      AA      AA  RR      RR      TT      MM  MM  MM
          RRRRRRRR    EEEEEEEE      SSSSSS        TT      AA      AA  RRRRRRRR        TT      MM      MM
          RRRRRRRR    EEEEEEEE      SSSSSS        TT      AA      AA  RRRRRRRR        TT      MM      MM
          RR  RR      EE                  SS      TT      AAAAAAAAAA  RR  RR          TT      MM      MM
          RR  RR      EE                  SS      TT      AAAAAAAAAA  RR  RR          TT      MM      MM
          RR    RR    EE                  SS      TT      AA      AA  RR    RR        TT      MM      MM      ....
          RR    RR    EE                  SS      TT      AA      AA  RR    RR        TT      MM      MM      ....
          RR      RR  EEEEEEEEEE  SSSSSSSS        TT      AA      AA  RR      RR      TT      MM      MM      ....
          RR      RR  EEEEEEEEEE  SSSSSSSS        TT      AA      AA  RR      RR      TT      MM      MM      ....

          LL            IIIIII      SSSSSSSS
          LL            IIIIII      SSSSSSSS
          LL              II      SS
          LL              II      SS
          LL              II      SS
          LL              II      SS
          LL              II        SSSSSS
          LL              II        SSSSSS
          LL              II              SS
          LL              II              SS
          LL              II              SS
          LL              II              SS
          LLLLLLLLLL    IIIIII    SSSSSSSS
          LLLLLLLLLL    IIIIII    SSSSSSSS
```

```
Table of contents
```

```
    0000            .TITLE  RESTARTM        Reel checkpoint and restart
    0000            .IDENT  'V04-000'
    0000    ;---
    0000    ;
    0000    ;****************************************************************************
    0000    ;*                                                                          *
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    0000    ;*                                                                          *
    0000    ;*                                                                          *
    0000    ;****************************************************************************
    0000
    0000    ;++
    0000    ; FACILITY:
    0000    ;       Backup/Restore
    0000    ;
    0000    ; ABSTRACT:
    0000    ;       This module contains routines to save and restore the low-level machine
    0000    ;       state for reel checkpoint and restart.
    0000    ;
    0000    ; ENVIRONMENT:
    0000    ;       VAX/VMS user mode.
    0000    ;
    0000    ;
    0000    ;--
    0000
    0000    ; AUTHOR: M. Jack, CREATION DATE: 30-May-1981
    0000    ;
    0000    ;
    0000    ; MODIFIED BY:
    0000    ;
    0000    ;       V03-001 MLJ0090         Martin L. Jack, 7-May-1982  13:26
    0000    ;               Repair reel restart.
    0000    ;
    0000    ;       V02-001 MLJ0054         Martin L. Jack, 22-Nov-1981  22:24
    0000    ;               Integrate GET_VM and FREE_VM jacket routines.
    0000    ;
    0000    ;
    0000    ;**
    0000
    0000
00000000            .PSECT  CODE,EXE,NOWRT
```

```
                           0000         .SBTTL  CHECKPOINT_M            Checkpoint machine state
                           0000
                           0000 ;++
                           0000 ;
                           0000 ; Functional Description:
                           0000 ;       This routine checkpoints the low-level machine state so that we can
                           0000 ;       later restart at the same point.
                           0000 ;
                           0000 ; Calling Sequence:
                           0000 ;       CALLS/CALLG
                           0000 ;
                           0000 ; Input Parameters:
                           0000 ;       04(AP) = CHKPT_HIGH_SP
                           0000 ;       08(AP) = Address of CHKPT_STACK
                           0000 ;       12(AP) = Address of CHKPT_LOW_SP
                           0000 ;
                           0000 ; Implicit Inputs:
                           0000 ;       none
                           0000 ;
                           0000 ; Output Parameters:
                           0000 ;       none
                           0000 ;
                           0000 ; Implicit Outputs:
                           0000 ;       none
                           0000 ;
                           0000 ; Routines Called:
                           0000 ;       GET_VM
                           0000 ;
                           0000 ; Routine Value:
                           0000 ;       none
                           0000 ;
                           0000 ; Signals:
                           0000 ;       none
                           0000 ;
                           0000 ; Side Effects:
                           0000 ;       none
                           0000 ;
                           0000 ;--
                           0000
                     0FFC  0000         .ENTRY  CHECKPOINT_M,^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                           0002 ;
                           0002 ;       The entry mask specifies all registers so that when the RET in
                           0002 ;       RESTART_M executes, all registers are restored.
                           0002 ;
                           0002 ;       Save the frame pointer in the global variable CHKPT_LOW_SP.
                           0002 ;
       0C BC     5D   D0   0002         MOVL    FP,@12(AP)              ; Save stack base pointer
                           0006 ;
                           0006 ;       Compute the difference between the saved frame pointer in the global
                           0006 ;       variable CHKPT_HIGH_SP and CHKPT_LOW_SP.  This value is the length
                           0006 ;       of the section of stack that will be saved.  It includes the stack
                           0006 ;       frame for this routine.
                           0006 ;
       56     04 AC   7D   0006         MOVQ    4(AP),R6                ; R6 = CHKPT_HIGH_SP
                           000A                                         ; R7 = Address of CHKPT_STACK
   7E     56     5D   C3   000A         SUBL3   FP,R6,-(SP)             ; Compute size of stack to save
                           000E ;
```

```
                               000E   116 ;         Allocate the dynamic memory, placing the address of the allocated
                               000E   117 ;         space in the global variable CHKPT_STACK.
                               000E   118 ;
                      6E   DD  000E   119           PUSHL   (SP)                    ; Copy size of stack to save
        00000000'GF   01   FB  0010   120           CALLS   #1,G^GET_VM             ; Allocate space to hold saved stack
                 67   50   D0  0017   121           MOVL    R0,(R7)                 ; Store address in CHKPT_STACK
                               001A   122 ;
                               001A   123 ;         Copy the stack area to the dynamic memory, and return.
                               001A   124 ;
         00 B7    6D  6E   28  001A   125           MOVC3   (SP),(FP),@(R7)         ; Save the stack area
                           04  001F   126           RET
```

```
                        0020          .SBTTL  RESTART_M                  Restart given saved machine state
                        0020
                        0020    ;++
                        0020    ;
                        0020    ; Functional Description:
                        0020    ;         This routine restarts using the low-level machine state that was saved
                        0020    ;         by CHECKPOINT_M.
                        0020    ;
                        0020    ; Calling Sequence:
                        0020    ;         CALLS/CALLG
                        0020    ;
                        0020    ; Input Parameters:
                        0020    ;         04(AP) = CHKPT_LOW_SP
                        0020    ;         08(AP) = CHKPT_HIGH_SP
                        0020    ;         12(AP) = Address of CHKPT_STACK
                        0020    ;
                        0020    ; Implicit Inputs:
                        0020    ;         none
                        0020    ;
                        0020    ; Output Parameters:
                        0020    ;         none
                        0020    ;
                        0020    ; Implicit Outputs:
                        0020    ;         none
                        0020    ;
                        0020    ; Routines Called:
                        0020    ;         none
                        0020    ;
                        0020    ; Routine Value:
                        0020    ;         none
                        0020    ;
                        0020    ; Signals:
                        0020    ;         none
                        0020    ;
                        0020    ; Side Effects:
                        0020    ;         none
                        0020    ;
                        0020    ;--
                        0020
                  0000  0020          .ENTRY  RESTART_M,^M<>             ; Register save irrelevant
                        0022    ;
                        0022    ;         Compute the difference between the saved frame pointer in the global
                        0022    ;         variable CHKPT_HIGH_SP and CHKPT_LOW_SP.  This value is the length
                        0022    ;         of the section of stack that will be restored from the saved copy.
                        0022    ;
   56    08 AC     7D   0022          MOVQ    8(AP),R6                   ; R6 = CHKPT_HIGH_SP
                        0026                                             ; R7 = Address of CHXPT_STACK
   56    04 AC     C2   0026          SUBL2   4(AP),R6                   ; Compute length of saved area
                        002A    ;
                        002A    ;         Now restore the FP and SP registers to the values they had on entry to
                        002A    ;         routine CHECKPOINT_M.  Then, copy the saved section of stack to the
                        002A    ;         stack.  This restores the stack to the exact state that it was
                        002A    ;         in on entry to routine CHECKPOINT_M.  It is important not to cause
                        002A    ;         any signals or other stack activity during these three instructions.
                        002A    ;
   5D    04 AC     D0   002A          MOVL    4(AP),FP                   ; Restore stack pointers
      5E    5D     D0   002E          MOVL    FP,SP                      ;
```

```
        6D   00 B7   56   28  0031   185            MOVC3   R6,@(R7),(FP)             ; Restore stack
                              0036   186 ;
                              0036   187 ;          The following RET instruction executes in the context of routine
                              0036   188 ;          CHECKPOINT_M, because the stack has been restored, and returns to
                              0036   189 ;          the caller of routine CHECKPOINT_M.  The previous execution flow has
                              0036   190 ;          been entirely lost.
                              0036   191 ;
                          04  0036   192            RET                               ; Return to caller of CHECKPOINT_M
        0037   194          .END
```

```
CHECKPOINT_M     00000000 RG    01
GET_VM           ********    X  01
RESTART_M        00000020 RG    01

                                              +-----------------+
                                              ! Psect synopsis !
                                              +-----------------+

PSECT name                        Allocation            PSECT No.  Attributes
----------                        ----------            ---------  ----------
.  ABS  .                         00000000  (      0.)  00 (   0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD  NOWRT NOVEC BYTE
CODE                              00000037  (     55.)  01 (   1.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD  NOWRT NOVEC BYTE

                                           +------------------------+
                                           ! Performance indicators !
                                           +------------------------+

Phase                        Page faults    CPU Time       Elapsed Time
-----                        -----------    --------       ------------
Initialization                        13    00:00:00.08    00:00:00.86
Command processing                    88    00:00:00.62    00:00:03.16
Pass 1                                72    00:00:00.44    00:00:02.14
Symbol table sort                      0    00:00:00.00    00:00:00.00
Pass 2                                52    00:00:00.33    00:00:01.34
Symbol table output                    2    00:00:00.01    00:00:00.01
Psect synopsis output                  1    00:00:00.02    00:00:00.09
Cross-reference output                 0    00:00:00.00    00:00:00.00
Assembler run totals                 230    00:00:01.50    00:00:07.60

The working set limit was 750 pages.
2036 bytes (4 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 3 non-local and 0 local symbols.
194 source lines were read in Pass 1, producing 17 object records in Pass 2.
0 pages of virtual memory were used to define 0 macros.

                                          +----------------------------+
                                          ! Macro library statistics !
                                          +----------------------------+

Macro library name                          Macros defined
------------------                          --------------
_$255$DUA28:[SYSLIB]STARLET.MLB;2                 0

0 GETS were required to define 0 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:RESTARTM/OBJ=OBJ$:RESTARTM MSRC$:RESTARTM/UPDATE=(ENH$:RESTARTM)
```

0013 AH-BT13A-SE
VAX/VMS V4.0

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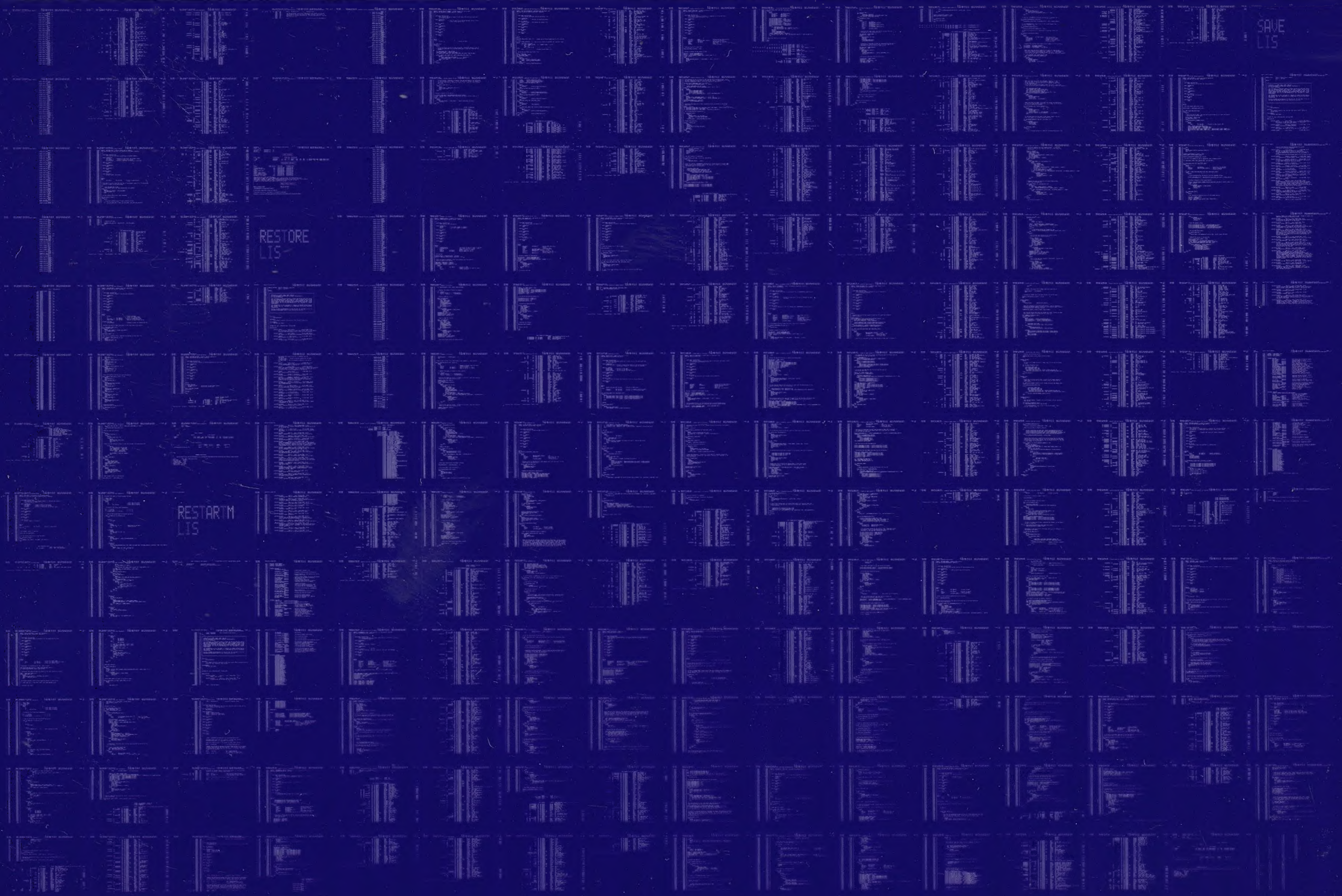

SAVE
LIS

RESTORE
LIS

RESTARTM
LIS